WE CLAIM:

1. Detector for a time-of-flight mass spectrometer comprising:

an electron multiplier, for converting a particle into a multiplicity of electrons; and

a scintillator, for converting the multiplicity of electrons into a multiplicity of photons;

whereby said detector is electro-optically isolated from a high voltage portion of the time-of-flight mass spectrometer.

2. Detector of claim 1, further comprising a photomultiplier for converting the multiplicity of photons into a corresponding second multiplicity of electrons.

3. Detector of claim 2, wherein said photomultiplier sums the second multiplicity of electrons into a charge pulse.

4. Detector of claim 1, further comprising a coating on said electron multiplier selected from aluminum oxide (Al_2O_3), magnesium oxide (MgO), tin oxide (SnO_2), quartz (SiO_2), barium flouride (BaF_2), rubidium tin (Rb_3Sn), berrylium oxide (BeO), diamond and combinations thereof.

5. Detector of claim 1, wherein said electron multiplier comprises a multichannel plate.

6. Cartridge for the detector of claim 5, comprising a cartridge body configured to receive said multichannel plate, said cartridge being readily removeable from and installable in said detector.

7. Detector of claim 1, wherein said scintillator is configured to provide a frequency bandwidth which accommodates arrival times of the multiplicity of electrons.

8. Detector of claim 1, wherein said scintillator is constructed from Bicron 418, Bicron 422b or combinations thereof.

9. Detector of claim 1, further comprising a coating on said scintillator configured to reflect photons generated therein.

10. Detector of claim 1, further comprising a coating on said scintillator selected from aluminum, chrome and combinations thereof.

11. Electron multiplier having a coating selected from aluminum oxide (Al_2O_3), magnesium oxide (MgO), tin oxide (SnO_2), quartz (SiO_2), barium flouride (BaF_2), rubidium tin (Rb_3Sn), berrylium oxide (BeO), diamond and combinations thereof.

12. Electron multiplier of claim 11, defining a multichannel plate.

13. Method of detecting a particle with a time-of-flight mass spectrometer comprising:

accelerating the particle with a voltage;

converting the particle into a multiplicity of electrons with a detector of the time-of-flight mass spectrometer; and

converting the multiplicity of electrons into a multiplicity of photons, thereby electro-optically isolating the detector from a high voltage portion of the time-of-flight mass spectrometer.

14. Method of claim 13, wherein said converting the particle is achieved with a multichannel plate.

15. Method of claim 14, further comprising enhancing secondary electron emissivity of the multichannel plate with a coating selected from aluminum oxide (Al_2O_3), magnesium oxide

(MgO), tin oxide (SnO_2), quartz (SiO_2), barium flouride (BaF_2), rubidium tin (Rb_3Sn), berrylium oxide (BeO), diamond and combinations thereof.

16. Method of claim 13, wherein the voltage ranges from -15kV to +15kV.

17. Method of claim 15, wherein said converting the particle is achieved with a multichannel plate.

18. Method of claim 13, further comprising converting the photons into a second multiplicity of electrons.

19. Method of claim 18, further comprising summing the second multiplicity of electrons into a charge pulse.

20. Method of claim 18, wherein said converting the photons is achieved with a scintillator.

21. Method of claim 20, wherein the scintillator is configured to provide a frequency bandwidth which accommodates arrival times of the multiplicity of electrons.

22. Method of claim 20, wherein the scintillator is constructed from Bicron 418, Bicron 422b or combinations thereof.

23. Method of claim 20, wherein the scintillator has a coating thereon for reflecting photons generated therein.

24. Method of claim 20, wherein the scintillator has a coating thereon selected from aluminum, chrome and combinations thereof.

25. Detector for a time-of-flight mass spectrometer comprising:

an electron multiplier, for converting particles into a multiplicity of first electrons;

a scintillator, for converting the multiplicity of first electrons into a multiplicity of photons; and

a photomultiplier for converting the multiplicity of photons into a second multiplicity of electrons.

whereby said detector is electro-optically isolated from a high voltage portion of the time-of-flight mass spectrometer.

26. Detector for a time-of-flight mass spectrometer responsive to input particles, each having a corresponding mass, for producing output pulses representative of the respective masses of the particles, comprising:

a biased input for differentially accelerating each input particle in accordance with its mass;

a first electron multiplier, for converting the accelerated input particle into a corresponding multiplicity of first electrons;

a scintillator, responsively coupled to the first electron multiplier for converting the multiplicity of first electrons into a multiplicity of corresponding photons; and

a second electron multiplier responsively coupled to the scintillator for converting the multiplicity of photons into a corresponding second multiplicity of electrons, said second electron multiplier being electrically isolated from the scintillator.

27. Detector for a time-of-flight mass spectrometer responsive to input particles, each having a corresponding mass, for producing output pulses representative of the respective masses of the particles, comprising:

a biased input for differentially accelerating each input particle in accordance with its mass;

a microchannel plate electron multiplier, for converting the accelerated input particle into a corresponding multiplicity of first electrons;

a scintillator, responsively coupled to the microchannel plate electron multiplier for converting the multiplicity of first electrons into a multiplicity of corresponding photons; and

a photomultiplier tube electron multiplier responsively coupled to the scintillator for converting the multiplicity of photons into a corresponding second multiplicity of electrons, said photomultiplier tube electron multiplier being electrically isolated from the scintillator.